capacitor insulating film.

REMARKS

I. Introduction

In response to the pending Office Action, Applicants have amended claim 1 so as to clarify the intended subject matter of the present invention, and have amended claim 4 so as to address the pending rejection under 35 U.S.C. § 112, second paragraph. No new matter has been added.

II. The Rejection Of The Claims Under 35 U.S.C. § 112, Second Paragraph

Claim 4 was rejected under 35 U.S.C. § 112, second paragraph, for failing to distinctly point out and claim the subject matter of the invention. In particular, it was stated that the phrase "said second insulating film defining said capacitor insulating film" is unclear, and that the phrase "said supporting film comprising an insulating film interposed between said interlayer insulating film and said capacitor insulating film" is also unclear. In response to the pending rejection, Applicants have amended claim 4 to clarify the structure of the present invention.

Specifically, referring to Fig. 5, as recited by claim 4, the silicon nitride film 18 corresponds to an etch stopping film, the BPSG film 16 corresponds to the first insulating film, the silicon oxide film 17 corresponds to the supporting film and the oxidized silicon nitride film 23x corresponds to the second insulating film. Thus, as explained in detail on page 40 of the specification, the oxidized silicon nitride film 23x

corresponds to the capacitor insulating film, not the silicon nitride film 18. Further, claim 4 has been amended so as to clarify that the supporting film (film 17) is interposed between the interlayer insulating film and the capacitor insulating film.

It is respectfully submitted that the foregoing explanation along with the amendment of claim 4 makes it clear that claim 4 is neither unclear nor ambiguous, and that it complies with all requirements of 35 U.S.C. § 112, second paragraph.

III. The Rejection Of The Claims Under 35 U.S.C. § 102

Claims 1, 7, 12 and 13 were rejected under 35 U.S.C. § 102 as being anticipated by USP No. 5,936,272 to Lee. For the following reasons, Applicants respectfully submit that the pending claims are patentable over Lee.

As recited by amended claim 1, and referring to Fig. 5, the present invention relates to a semiconductor device comprising a substrate 1 having a semiconductor region; a first insulating film (BPSG film 3) formed on the substrate and having the property of reflowing due to subsequent heat treatments; a second insulating film 23x containing silicon nitride formed over the first insulating film 16 and a supporting film 17 formed between the first insulating film 16 and the second insulating film 23x. The supporting film 17 operates in-part to exert a stress on the second insulating film 23x so as to reduce deformation of the second insulating film during heat treatments. **As recited by amended claim 1, the entire lower surface of the supporting film 17 contacts the upper surface of the first insulating film 16.**

Turning to the cited prior art, referring to Fig. 4G thereof, Lee discloses a semiconductor device including a substrate 100; a gate 70 formed on the substrate; a

first insulating layer 125 (BPSG film); a second insulating layer (O_3-TEOS film) 135 formed on the first insulating layer; and a third insulating layer (silicon nitride film) 136 formed on the second insulating layer. As shown in Fig. 4G, the BPSG layer 125 is formed so as to be nearly level with the upper surface of the gate line cap 72. The second insulating layer 135 of Lee is asserted as corresponding to the claimed supporting film.

However, as is clear from Fig. 4G of Lee, only a portion of the lower surface of the second insulating layer 135 (which is asserted as corresponding to the claimed supporting film) contacts the upper surface of the first insulating layer 125. Specifically, as shown in Fig. 4G, approximately half of the lower surface of the second insulating layer is disposed on the gate line cap 72, and not the first insulating layer 125.

Thus, as anticipation under 35 U.S.C. § 102 requires that each element of the claim in issue be found, either expressly described or under principles of inherency, in a single prior art reference ***Kalman v. Kimberly-Clark Corp.***, 713 F.2d 760, 218 USPQ 781 (Fed. Cir. 1983), and Lee fails to disclose that **the entire lower surface of the supporting layer 135 contacts the upper surface of the first insulating layer 125,** it is clear that Lee does not anticipate amended claim 1, or any claim dependent thereon.

It is further noted that the O_3-TEOS layer 135 of Lee functions as an interlayer insulating film, and does not perform the function the claimed support film, which operates to apply a stress against deformation of the second insulating film during heat treatments.

For the foregoing reasons, it is respectfully submitted that amended claim 1, and all claims dependent thereon, are patentable over Lee.

IV. All Dependent Claims Are Allowable Because The Independent Claim From Which They Depend Is Allowable

Under Federal Circuit guidelines, a dependent claim is nonobvious if the independent claim upon which it depends is allowable because all the limitations of the independent claim are contained in the dependent claims, ***Hartness International Inc. v. Simplimatic Engineering Co.***, 819 F.2d at 1100, 1108 (Fed. Cir. 1987). Accordingly, as claim 1 is patentable for the reasons set forth above, it is respectfully submitted that all pending dependent claims are also in condition for allowance.

V. Request For Notice Of Allowance

Having fully responded to all matters raised in the Office Action, Applicants submit that all claims are in condition for allowance, an indication for which is respectfully solicited.

If there are any outstanding issues that might be resolved by an interview or an Examiner's amendment, the Examiner is requested to call Applicants' attorney at the telephone number shown below.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Please cancel claims 35 and 36, without prejudice.

Please amend claims 1 and 4 as follows:

1. (Twice Amended) A semiconductor device comprising:

a substrate having a semiconductor region,

a first insulating film formed on said semiconductor region and having a property of reflowing due to a heat treatment under predetermined conditions,

a second insulating film formed [on] over said first insulating film and containing at least silicon nitride, and

[a third insulating film formed at a higher level than said first insulating film and having a property of reflowing due to a heat treatment under said predetermined conditions, and]

a supporting film formed between said first and second insulating films for applying to said second insulating film a stress against deformation of said second insulating film caused by said heat treatment,

wherein the entire lower surface of the supporting film contacts the upper surface of the first insulating film.

4. (Amended) A semiconductor device as set forth in Claim 1, wherein said semiconductor device is a stacked DRAM cell comprising a gate formed on said semiconductor region, an impurity diffusion layer formed in a region sideways of said gate in said semiconductor region, an interlayer insulating film formed on said gate and

said semiconductor region, a storage node filling an opening formed in said interlayer insulating film and extending over a part of said interlayer insulating film, a capacitor insulating film formed for coverage over said storage node and said interlayer insulating film, and a plate electrode formed in opposed relation with said storage node via said capacitor insulating film,

said first insulating film defining said interlayer insulating film,

said second insulating film defining said capacitor insulating film,

said supporting film [comprising an insulating film] is interposed between said interlayer insulating film and said capacitor insulating film.